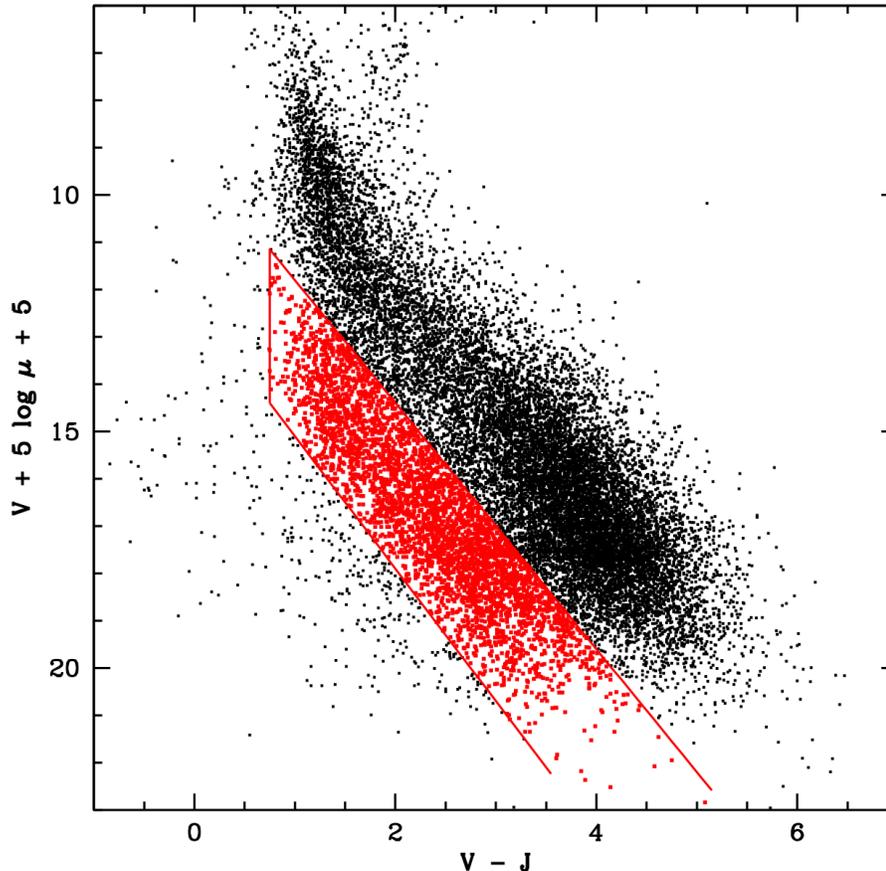


## K2 Campaign 0 Target Proposal

**Title:** A KEPLER-K2 search for exoplanets orbiting main-sequence stars of the local Galactic halo population.

**Proposer:** Sebastien Lepine, Georgia State University



**Scientific Justification:** To date, the local halo population has not been systematically searched for exoplanets. It remains unclear whether the oldest stars in our Galaxy formed planets in significant numbers or not, or whether these planets are physically different from the planets that formed in more metal-rich environments. The only way to answer these questions is to conduct a systematic survey of a large number of halo stars.

The K2 campaign 0 field has been entirely searched for high proper motion stars as part of the SUPERBLINK proper motion survey (e.g. Lépine & Shara 2005, AJ 129, 1483; Lépine & Gaidos 2011, AJ 143, 138), which lists 21,443 stars with proper motion  $\mu > 40$  mas/yr within 12 degrees radius of the proposed field center. A reduced proper motion diagram (see figure) identifies a population of high-velocity halo stars, sandwiched between the main locus of field main-sequence stars (upper right) and the bluer population of white dwarfs (lower left). This Galactic halo locus is confirmed by spectroscopic follow-up observations (Lépine, Rich, & Shara 2007, ApJ 669, 1235). A total of 3,847 halo candidates are identified based on color and reduced proper motion cuts (red dots). This suggests that the final, 105 sq. deg. K2 field should contain about 900 main-sequence halo targets.

Interestingly, about 55% of the proposed target are expected to be late-K and M type main sequence stars, based on V-J color ( $V-J > 2.5$ ), which means Earth-sized planets could potentially be detected transiting those stars.